Assessment of the effects of ground−water/surface−water interaction on Calfed Management Decisions

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Public Comments

No public comments were received for this proposal.

Technical Synthesis Panel Review

Proposal Title

#0261: Assessment of the effects of ground−water/surface−water interaction on Calfed Management Decisions

Final Panel Rating
adequate

Technical Synthesis Panel (Primary) Review

TSP Primary Reviewer's Evaluation Summary And Rating:

The basic premise of the proposal is quite timely and important: Dr. Reichard and his colleauges plan to evaluate the hydrologic effects of a range of different conjunctive use projects (hydrologic effects will be quantified in terms of water levels, aquifer storage, and surface flows). Studies of conjunctive use are important for CALFED because of the dwindling storage in the mountain snowpack. The proposed work is fairly dull. The applicants propose to link together a couple of groundwater models that already exist; they plan to use downscaled output from a climate model to drive MODFLOW (without properly accounting for uncertainties in future climate projections); and they propose to use this modeling framework to evaluate the benefits and pitfalls of different conjunctive use options. There is nothing creative about the proposed work −− the proposal may lead to some interesting findings of interest to decision makers, but it is difficult to get excited about it. Pertinent reviewer comments include: (1) The main focus of the project is to use simulation models. However, it is a well−known fact that the problem [with models] is their uncertainty. The treatment of uncertainty is critical to understanding and prediction of ground water/surface water interaction, conjunctive use, and different climate scenarios. There is no "radical" or fresh

thinking on how to reduce the uncertainty of models. (2) The value of the work is clear, however, the proposal could have benefited by a more complete discussion of exactly how the new elements would correct current deficiencies.

Additional Comments:

The basic premise of the proposal is quite timely and important: Dr. Reichard and his colleauges plan to evaluate the hydrologic effects of a range of different conjunctive use projects (hydrologic effects will be quantified in terms of water levels, aquifer storage, and surface flows). Studies of conjunctive use are important for CALFED because of the dwindling storage in the mountain snowpack. The proposed work is fairly dull. The applicants propose to link together a couple of groundwater models that already exist; they plan to use downscaled output from a climate model to drive MODFLOW (without properly accounting for uncertainties in future climate projections); and they propose to use this modeling framework to evaluate the benefits and pitfalls of different conjunctive use options. There is nothing creative about the proposed work −− the proposal may lead to some interesting findings of interest to decision makers, but it is difficult to get excited about it. Pertinent reviewer comments include: (1) The main focus of the project is to use simulation models. However, it is a well−known fact that the problem [with models] is their uncertainty. The treatment of uncertainty is critical to understanding and prediction of ground water/surface water interaction, conjunctive use, and different climate scenarios. There is no "radical" or fresh thinking on how to reduce the uncertainty of models. (2) The value of the work is clear, however, the proposal could have benefited by a more complete discussion of exactly how the new elements would correct current deficiencies.

Technical Synthesis Panel (Discussion) Review

TSP Observations, Findings And Recommendations:

The proposal seeks to link different models to analyze conjunctive−use scenarios. The goals were considered important and timely. The panel felt the project might produce some results of use to decision−makers but there was nothing exciting or compelling about the proposed approach or anticipated products. The applicants do not describe hypotheses that this project will address and so categorizing the project as “science” is questionable. The orientation of this project is basically software−development – the wiring together of existing models without properly accounting for uncertainty. As a result, the project budget was deemed to be excessive – there will not be much return on this rather large investment. Had the applicants described more about the actual conjunctive−use scenarios they will model, how these will interact with the climate scenarios, and the anticipated usefulness of the end−products, the panel might have raised the rating of this proposal. As it stands, the panel felt this was a fairly pedestrian, engineering exercise.

Rating: Adequate

Technical Review #1

proposal title: Assessment of the effects of ground−water/surface−water interaction on Calfed Management Decisions

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**Objectives of the project are clearly stated. The main focus of the project is to use simulation models. However, it is well known fact that the problem is their uncertainty. The treatment of uncertainty is critical to understanding of prediction of ground water/surface water interaction, conjunctive use and different climate scenarios. There is no question in my mind that the idea is timely and important. However, I could not find in the proposal how the authors are planning to treat uncertainty?**
Rating	**good**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**Study is justified relative to existing knowledge. However, it is completely dependent on modeling. For example, the need of independent quantification of recharge/discharge parameter for model is not explicitly stated. The deep symmetry of topographic, subsurface and ecohydrological organization is not recognized in the proposal. The linkage between the drainage network and the pattern of water balance**

	components, including recharge/discharge should be incorporated into study.
Rating	**good**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**Yes, the modeling approach is well designed and feasible and the result will be useful. They can add to the base knowledge. However, the methodology could be dramatically improved if the system analysis and the pattern of water balance components could be incorporated into model. For example, the recharge/discharge rates as constant could be determined based on pattern recognition and association with geomorphologic, geologic and ecohydrological organizations. These values could serve as independent input into the model. Information developed in this proposal will be useful to decision makers, but with suggested addition it reflect novel ideas and thinking, rather than be confined in the "box" of model.**
Rating	**good**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**The approach of modeling is proven technically, and MODFLOW is used all over the World. As proposed by authors the project is very likely to be successful and consistent with objectives. The same positive comment could be said about scale.**

Rating	**very good**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**Not applicable**
Rating	**excellent**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**The updated MODFLOW model and Groundwater Management Package will be very valuable to larger data management systems. The linkage of climate variability mad model input is very valuable, particularly for conjunctive use. Water budget components will be useful for water managers and practitioners applying other models.**
Rating	**very good**

Additional Comments

Comments	**The main concern, as stated above, is the project is completely dependent on modeling. There is a need for shift in thinking, That it is possible to quantify the recharge/discharge components as well as other water balance components via coupled topographic, drainage network, geologic and ecohydrologic organization. The water balance components could be determined independently via pattern recognition. Then, these parameters could serve as input into the models.**

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**The authors are very highly qualified professionals. The only problem: they think the old fashion way – modeling.**
Rating	**excellent**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**It seems to me that budget is too high. MODFLOW model is well known. Besides they will update the model, which do not require additional fieldwork. All they are going to use existing data. Plus travel and office supply seems on the high side. There is also no $ amount on what is the total of non−federal funds requested?**
Rating	**good**

Overall

Provide a brief explanation of your summary rating.

Comments	**The rating is based that authors use the traditional methodology, which is modeling. There are no questions that authors are highly qualified professionals and can offer solutions via modeling. However, there is no "radical" and fresh thinking on how to resolve the issue of uncertainty of models. The most critical point is that there is a NEED to quantify recharge/discharge components independently, rather than via calibration of models. This could be done via pattern recognition of surface, subsurface and**

	ecohydrological organizations. The water balance components in this organization are linked by probabilistic features whose basic characteristics remain unchanged regardless of scale, geology, or climate.
Rating	**good**

Technical Review #2

proposal title: Assessment of the effects of ground−water/surface−water interaction on Calfed Management Decisions

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**The goals are appropriate and relevant to the needs of water users in the Central Valley and San Francisco Bay. It is timely and important, and capitalizes on new technologies in groundwater modeling.**
Rating	**excellent**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**The value of the work is clear, however, the proposal could have benefited by a more complete discussion of exactly how the new elements would correct current deficiencies.** **The proposal fails to articulate clearly the scope and scale of individual tasks. Several of the tasks imply a limited scope (e.g. to a specific locality), but it is not clear how these may relate to others in the project.**
Rating	**good**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**The approach for each task is generalized, often lacking specific details. Methods "will be developed" given some generalized objectives (which are generally well founded).** **I like the idea of using the tools to support both conjunctive use analyses and climatic scenarios, although the idea of "optimizing" a conjunctive use scenario via the model is a little optimistic, given the uncertainties typically associated with model inputs and the complexities associated with real water allocations and distribution dynamics.** **It is clear that the project will eventually lead to better prediction and analysis tools, although it is not clear if this project will be sufficient to get there. I suspect that the outcome of the project will make significant advancements toward higher resolution groundwater modeling. However, the sensitivity (and thus the value) of such a model to large−scale climatic models is unclear.**
Rating	**good**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**The approach is vaguely outlined, so its technical feasibility is difficult to gage. However, the USGS tyoically applies rigorous scientific standards through exceptionally talented scientists. I would**

	suspect that the feasibility of some type of deliverable is likely, although the specific deliverables offered are relatively vague.
Rating	**good**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**The proposal does not fully describe how monitoring data will be incorporated into the project. It is implied that well−log data will be applied to calibrate the model, but it is not clear if any actual data will be used to validate the model output.**
Rating	**fair**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**The products will likely be of some value, however it is unclear if "optimized" solutions from model−space are of specific value to management without any real−world validation. Since a large component of this study involves extrapolation of global climate modeling into a groundwater model, one could easily see a scinario wherein the value of the study is subject to considerable skepticism from operational managers (e.g. water districts, farmers, etc).** **The overall value of the products are not clear. While the spatial and temporal resolution will be refined somewhat, the sensitivity to inputs and the variability is difficult to gage at this time. I suspect that considerable interpretation will be**

	required of the final products, and that the interpretations will be subject to implied assumptions associated with the modeling.
Rating	**good**

Additional Comments

Comments	**I feel that the cost and scope of this project are very large, and might be worth considerable scrutiny. It may be more appropriate to scale down this study to a smaller region where real data can be collected to calibrate and validate the models.** **I would also have liked a more thorough description of the project in terms of what the deliverables would be and specifically how they would be used to address key management issues.**

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**The team appears highly competent to tackle this project. It has a full compliment of experts, each tasked to specific pieces of the project, which supports project accountability.** **It's only drawback is that it relies almost entirely on USGS staff. While the USGS offers excellent talent, it may help to expand the acceptance of this project if it were to involve experts from other state and federal agencies as well as from the academic community.**
Rating	**excellent**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**It is hard to gage the level of the budget relative to the work proposed, because the tasks are not well constrained in the proposal. The proposal appears geared more toward the idea of "give us some money and we'll work on it some more". While I suspect that considerable progress could be made as a result of funding this proposal, its not clear what specific deliverables would be available at the completion of the project. Therefore, it is difficult to gage the value of the proposal's budget.**
Rating	**fair**

Overall

Provide a brief explanation of your summary rating.

Comments	**Overall, I believe this project would provide value, although it is difficult to weigh the value relative to other projects with more modest budgets. I believe the organization is clearly competent to handle the task. However, the vague details in the approach and the budget suggest some uncertainty as to what the end product would provide and the accountability associated with this funding request.**
Rating	**good**

Technical Review #3

proposal title: Assessment of the effects of ground−water/surface−water interaction on Calfed Management Decisions

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**Yes, the goals, objectives and hypotheses are clearly stated. This is well written proposal. Even though this kind of work (methodology, application, concept etc.) is not completely new in academia, the proposal has merits in regards to scale of the problem, application of new packages with widely used MODFLOW and so on. It is important to investigate conjunctive use of surface and groundwater alternatives in Central Valley, CA.**
Rating	**excellent**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**The study is justified as this an advancement of the existing USGS Central Valley model. The proposal clearly outlines the concept and methodology and explains the underlying basis. The selection of research is justified.**
Rating	**very good**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**The approach is well designed, appropriate and feasible for achieving the objectives of the project. The approach (methodology) is traditional; nevertheless the results are likely to be added to base of knowledge due to the nature of the application. The information might be used for decision making process. The linkage between surface water and groundwater is questionable because the model is not an integrated surface water−groundwater model.**
Rating	**very good**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**The approach is partially documented (which is understandable due to space limitation) but technically feasible. The project might be a successful, as the authors have strong research background and have performed research in the same project area.**
Rating	**very good**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**The approach does not outlined any monitoring design, however, this model should be calibrated with the observed data before any implementation. The authors should address this issue.**
Rating	**very good**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**The results from the project may be used in decision−making process, and has scientific values. The project outcome will less likely contribute to the larger data management system.**
Rating	**good**

Additional Comments

Comments

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**The authors are knowledgeable, prudent, established and capable, as their publication record indicates. The project team is qualified to effectively implement the proposed project. USGS is a well−reputed agency for research and has infrastructure to accomplish this project.**
Rating	**excellent**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**The proposed budget is reasonable and adequate. I think that the cost can be reduced if the project plan is efficient, and should be revised.**
Rating	**good**

Overall

Provide a brief explanation of your summary rating.

Comments	**The project combines and develops packages for MODFLOW, and finally the developed model is applied for the investigation of conjunctive use strategies. The development of management package with MODFLOW is a new contribution, and the application of the combined model will help decision makes to investigate alternatives. The model considers climatic variability to simulate drought and wet conditions, which may provide insight to manage water resources effectively and efficiently. However, the capability of MODFLOW is limited to link groundwater with surface water properly. A better dynamic tool to have an integrated model of subsurface (saturated and unsaturated) and surface water would be appropriate and might be considered.**
Rating	**very good**